REMARKS

Election/Restriction

Applicant's maintain that claim 20 is a linking claim linking the subject matter of Groups A and B. Claim 20 is directed to a liquid crystal film or layer with homeotropic alignment wherein said alignment is achieved with an aluminum or smooth aluminum oxide layer on a plastic substrate. With the examination of claim 20, Applicants submit it would not be an undue burden to extend the examination to the subject matter of claims 12,13, 17, 18 and 21-29 drawn to the use of an aluminum aligning layer.

New Claims

New claims 30-38 are directed to liquid crystal films as defined in the original claims but do not alternatively include a liquid crystal layer. Claims 37 and 38 define embodiments prepared from one or more polymerizable mesogenic compounds. Support for these claims is found on page 6 and continuing to page 7. The Amendments to the original claims serve to employ more conventional language consistent with the newly added claims. The amendments to the original claims do not change their scope.

New claims 39-40 define embodiments wherein the smoothness of the aluminum oxide layers is characterized.

Krueger et al. (U.S. Patent 4,112,157)

Krueger et al. do not anticipate any claims herein. Krueger et al. mentions the use of metal inorganic salt films on at least one carrier plate to orient all of the liquid crystal molecules without secondary processing. To accomplish this, a source of inorganic salt is provided, the salt vaporized, a carrier plate is positioned relative to the source of the salt and the salt is deposited as a film on the surface of the plate. The film is said to have "a column-like structure extending at an angle to the surface of the plate which is either perpendicular or

obliquely oriented to the surface." See column 2, lines 20-23. There is no indication that this technique provides a smooth surface. In addition, although Krueger et al. mentions the use of aluminum oxide, there is one of five alternative inorganic materials as possible orientation layers. There is no illustration of preparing aluminum oxide orientation layers. The only examples given by Krueger et al. illustrate the use of MgF_2. By not illustrating the use of an aluminum oxide orientation layer, Krueger et al. does not anticipate the claimed invention. Since the disclosure of Krueger et al is completely silent about the surface characteristics of the orientation layers prepared, particularly their smoothness and the significance of smooth layers in releasing the liquid crystal layer or film, Krueger et al. provides no direction for one skilled in the art to seek smooth aluminum oxide orientation layers. The advantages of smooth aligned layers, such as the elimination of the need to use special release agents in most cases, are not even suggested since no mention is made of the release properties of the aligned layers formed by Krueger et al.

As to claims 11 and 16, Krueger et al makes no mention of employing an aluminum aligning layer or an aluminum oxide coating which is transparent. Therefore, the subject matter of claims 11 and 16 are clearly not anticipated or obvious in view of Krueger et al.

The embodiments of this invention defined in claim 4, wherein the surface of the alignment layer is treated to corona discharge, are clearly not anticipated by Krueger et al. Krueger makes no mention of synthesizing aluminum oxide alignment layers, let alone and employing a corona discharge method on such a layer. While claim 4 incorporates a product by process limitation, this limitation does define embodiments further distinguished from the teachings of Krueger et al. with respect to their surface characteristics.

New claims 37-38 are directed to a liquid crystal films on an orientation layer created by polymerization of mesogenic compounds. Krueger et al makes no mention of producing such liquid crystal films.

Bahadur

The Office Action makes reference to Figure 5.13(c) on page 24 of the reference. This figure is said to illustrate a "microscopic columnar structure-assisted alignment" obtained by SiO-rotatively oblique evaporation. The structure of an aluminum oxide coating is not illustrated. Therefore, this reference does not anticipate the subject and the claims therein. Aluminum oxide is mentioned as an oxide material that provides liquid crystal orientation, but there is no indication the surface is smooth. It is also noted that the Bahadur reference makes no mention that the SiO layer in Figure 5.13(c) is smooth and Figure 5.13(c) provides no suggestion the surface of the SiO layer is smooth. Therefore, Badahur does not anticipate the subject matter of any of the pending claims.

Combined Teachings of Krueger and Badahur

The embodiments of this invention which employ an alignment layer on a plastic substrate are said to be obvious based on the Krueger and Badahur teachings. However, it is stated in the Office Action that neither reference discloses a substrate formed of a polymeric plastic material. No evidence has been presented which suggests that the use of plastic substrates would be obvious. Therefore, Applicants maintain a showing of *prima facia* obviousness has not been made with respect to the subject matter of claims 2, 3 and 20 and the rejection under 35 U.S.C. § 103 should be withdrawn.

Based on the above remarks, Applicants submit all pending claims are in form suitable for allowance and patentable over the cited references. Therefore, withdrawal of the rejections and allowance of these claims are earnestly solicited as well as rejoinder of claims 12, 13, 17, 18 and 21-29.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

2. (Amended) Liquid crystal film or layer according to claim 1 wherein ~~characterized in that~~ the substrate is a polymeric material.

3. (Amended) Liquid crystal film or layer according to claim 2 wherein ~~characterized in that~~ the substrate is a plastic sheet or film.

4. (Amended) Liquid crystal film or layer according to claim 1 wherein ~~characterized in that~~ the substrate prior to its coating with the alignment layer or its precursor is subjected to a corona discharge.

10. An electoptical ~~Electroptical~~ system which ~~characterized in that it~~ contains a liquid crystal film or layer according to claim 1.

Please add the following new claims.

--30. Liquid crystal film with homeotropic alignment **wherein** said hemitropic alignment is achieved by an aligning layer on a substrate wherein said aligning layer is a smooth Al_2O_3 layer.

31. Liquid crystal film according to claim 30 wherein the substrate is a polymeric material.

32. Liquid crystal film according to claim 31 wherein the substrate is a plastic sheet or film.

33. Liquid crystal film according to claim 30 wherein the substrate prior to its coating with the alignment layer or its precursor is subjected to a corona discharge.

34. Process of fabricating a homeotropically oriented liquid crystal film according to claim 30 which comprises applying an aligning layer as defined in claim 30 on a substrate.

35. An electroptical system which contains a liquid crystal film according to claim 30.

36. A liquid crystal film as in claim 30, wherein said aligning layer is a thin transparent Al_2O_3 coating.

37. Liquid crystal film as in claim 30 prepared from a layer comprising one or more polymerizable mesogenic compounds.

38. Liquid crystal film as in claim 30 prepared from a mixture comprising reactive mesogenic compounds of formula I

$$P\text{-}(Sp\text{-}X)_n\text{-}MG\text{-}R, \qquad I$$

wherein

P is a polymerizable group

Sp is a spacer group having 1 to 20 C atoms,

X is a group selected from -O-, -S-, -CO-, -COO-, -OCO-, -OCO-O- or a single bond;

n is 0 or 1,

MG is a mesogenic or mesogenity supporting group, according to formula II

$$-(A^1\text{-}Z^1)_m\text{-}A^2\text{-}Z^2\text{-}A^3\text{-} \qquad II$$

wherein A^1, A^2

and A^3 are independently from each other 1,4-phenylene in which, in addition, one or more CH groups may be replaced by N, 1,4-cyclohexylene in which, in addition, one or two non-adjacent CH_2 groups may be replaced by O and/or S, 1,4-cyclohexenylene or

napththalene-2,6-diyl, it being possible for all these groups to be unsubstituted, mono- or poly-substituted with halogen, cyano or nitro groups or alkyl, alkoxy or acyl groups having 1 to 7 C atoms wherein one or more H atoms may be substituted by F or Cl,

Z^1 and Z^2 are each independently -COO-, -OCO-, CH_2CH_2-, -OCH_2-, -CH_2O-, -CH_2=CH-, -C≡C-, -CH=CH-COO-, -CO-CH=CH- or a single bond and

m is 0, 1 or 2,

and

R is an alkyl radical with up to 25 C atoms which may be unsubstituted, mono-or polysubstituted by halogen or CN, it being also possible for one or more non-adjacent CH_2 groups to be replaced, in each case independently from one another, by -O-, -S-,-NH-,-N(CH_3)-, -CO-, -COO- -OCO-, -OCO-O-, -S-CO-, -CO-S- or -C≡C- in such a manner that oxygen atoms are not linked directly to one another, or alternatively R is halogen, cyano or has independently one of the meanings given for P-(Sp-X)$_n$-.

39. Liquid crystal film according to claim 30 wherein the surface of the smooth Al_2O_3 layer is smoother than aluminum oxide coatings obtained by evaporation methods or sputtering.

40. Liquid crystal film or layer according to claim 1 wherein the surface of the smooth Al_2O_3 layer is smoother than aluminum oxide coatings obtained by evaporation methods or sputtering.